

ASSESSING THE RELATIONSHIP BETWEEN SUPPLY CHAIN MANAGEMENT AND ORGANISATIONAL PERFORMANCE IN THE FILTERED WATER INDUSTRY IN GHANA

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ABSTRACT

Filtered water production has become a very important industry in Ghana. A lot of people are venturing into the production of filtered water and has and is becoming a source of economic empowerment for many entrepreneurs in Ghana. While many are folding up for inability to sustain and capture wider market, others are ever improving, increasing production and capturing wider markets. This study was to find out the relationship between Supply Chain Management and Organisational Performance in the filtered water industry in Ghana.

The study used both survey and in-depth interview to gather primary data. Simple random sampling was used to select respondents. The study area was limited to the northern sector of Ghana comprising the Ashanti, BrongAhafo, Northern regions. These areas were purposively selected due to the proliferation of sachet water factories in the regions. The research is a case study. 550 companies in the filtered water industry were selected. Microsoft Excel programme was used to help process data for analysis. It was discovered that many filtered water companies in northern Ghana were familiar with SCM activities and that there is positive relationship between SCM and organizational performance. A lot more are yet to reap significant benefits from applying / adopting SCM processes.

It is recommended that filtered water companies who do not practice SCM activities should endeavor to do so as it will in the long run help them to achieve the ultimate aims. In order to be successful in understanding SCM activities, filtered water companies should sit down and identify factors which rather make them unsuccessful to meet planned or actual demand as the most serious problem facing the SCM effort.

KEYWORDS: Supply Chain Management, Organisational Performance, Filtered water industry, Supply Chain Relationships

INTRODUCTION

Supply Chain Management (SCM) is the oversight of materials, information and finances as they move in a process from supplier to manufacturers, to wholesaler to retailer and to consumer. SCM involves coordinating and integrating these flows both within and among companies system to reduce inventory with the assumption that products are available when needed ([w.w.w.mariosalexandrou.com /scm: asp](http://www.mariosalexandrou.com/scm:asp)). SCM flows can be divided into three forms. These are products flow, information flow and finance flow.

The product flow includes the movement of goods from a supplier to a consumer as well as customer returns or service needs. The information flow involves transmitting order and updating the status of delivery. The finance flow comprises credit terms, payment schedule and consignment and title ownership, arrangements, organizational performance,

on the other hand, consists of an organ as measured against its intended output (en.wikipedia.org).

A supply chain is a network of facilities and distribution options that performs the functions of procurement of materials, transformation of these materials into intermediate and finished products, and the distribution of these finished products to customers. Supply chains exist in both service and manufacturing organizations, although the complexity of the chain may vary greatly from industry to industry and firm to firm.

Supply chain management is typically viewed to lie between fully vertically integrated firms, where the entire material flow is owned by a single firm and those where each channel member operates independently. Therefore coordination between the various players in the chain is key in its effective management. Cooper and Ellram (1993) compare supply chain management to a well-balanced and well-practiced relay team. Such a team is more competitive when each player knows how to be positioned for the hand-off. The relationships are the strongest between players who directly pass the baton, but the entire team needs to make a coordinated effort to win the race. Supply chain management has a direct relationship with organizational performance. A result, effective supply chain management has a positive correlation with organizational performance. In order for organizations to survive the global and local competition supply chain must be managed effectively. For instance, outbound logistics has been the biggest problem for many companies such as new online retailers.

It is in respect of these organizational challenges that this study is carried out, to as it were, find out that role of SCM in organizational performance.

LITERATURE REVIEW

According to Cooper, M.C., Lambert, D.M., & Pagh, J. (1997), Supply Chain Management must address the following problems:

- **Distribution Network Configuration:** number, location and network missions of suppliers, production facilities, distribution centers, warehouses, cross-docks and customers.
- **Distribution Strategy:** questions of operating control (centralized, decentralized or shared); delivery scheme, e.g., direct shipment, pool point shipping, cross docking, DSD (direct store delivery), closed loop shipping; mode of transportation, e.g., motor carrier, including truckload, LTL, parcel; railroad; intermodal transport, including TOFC (trailer on flatcar) and COFC (container on flatcar); ocean freight; airfreight; replenishment strategy (e.g., pull, push or hybrid); and transportation control (e.g., owner-operated, private carrier, common carrier, contract carrier).
- **Trade-Offs in Logistical Activities:** The above activities must be well coordinated in order to achieve the lowest total logistics cost. Trade-offs may increase the total cost if only one of the activities is optimized. For example, full truckload (FTL) rates are more economical on a cost per pallet basis than less than truckload (LTL) shipments. If, however, a full truckload of a product is ordered to reduce transportation costs, there will be an increase in inventory holding costs which may increase total logistics costs. It is therefore imperative to take a systems approach when planning logistical activities. These trades-offs are key to developing the most efficient and effective Logistics and SCM strategy.
- **Information:** Integration of processes through the supply chain to share valuable information, including demand signals, forecasts, inventory, transportation, potential collaboration, etc.

- **Inventory Management:** Quantity and location of inventory, including raw materials, work-in-progress (WIP) and finished goods.
- **Cash-Flow:** Arranging the payment terms and methodologies for exchanging funds across entities within the supply chain.

Supply chain execution means managing and coordinating the movement of materials, information and funds across the supply chain. The flow is bi-directional.

Supply chain management is a cross-function approach including managing the movement of raw materials into an organization, certain aspects of the internal processing of materials into finished goods, and the movement of finished goods out of the organization and toward the end-consumer. As organizations strive to focus on core competencies and becoming more flexible, they reduce their ownership of raw materials sources and distribution channels. These functions are increasingly being outsourced to other entities that can perform the activities better or more cost effectively. The effect is to increase the number of organizations involved in satisfying customer demand, while reducing management control of daily logistics operations. Less control and more supply chain partners led to the creation of supply chain management concepts. The purpose of supply chain management is to improve trust and collaboration among supply chain partners, thus improving inventory visibility and the velocity of inventory movement. (Larson, P.D. and Halldorsson, A. (2004). Logistics versus supply chain management: an international survey. *International Journal of Logistics: Research and Application*, vol. 7, Issue 1, 17- 31).

According to Lavassani, M. K., Movahedi B., Kumar V. (2008), several models have been proposed for understanding the activities required to manage material movements across organizational and functional boundaries. SCOR is a supply chain management model promoted by the Supply Chain Council. Another model is the SCM Model proposed by the Global Supply Chain Forum (GSCF). Supply chain activities can be grouped into strategic, tactical, and operational levels. The CSCMP has adopted The American Productivity & Quality Center (APQC) Process Classification Framework⁸ a high-level, industry-neutral enterprise process model that allows organizations to see their business processes from a cross-industry viewpoint;

- Strategic network optimization, including the number, location, and size of warehousing, distribution centres, and facilities.
- Strategic partnerships with suppliers, distributors, and customers, creating communication channels for critical information and operational improvements such as cross docking, direct shipping, and third party logistics.
- Product life cycle management, so that new and existing products can be optimally integrated into the supply chain and capacity management activities.
- Information technology chain operations.
- Where-to-make and what-to-make-or-buy decisions.
- Aligning overall organizational strategy with supply strategy.
- It is for long term and needs resource commitment.
- Sourcing contracts and other purchasing decisions.
- Production decisions, including contracting, scheduling, and planning process definition.

- Inventory decisions, including quantity, location, and quality of inventory.
- Transportation strategy, including frequency, routes, and contracting.
- Benchmarking of all operations against competitors and implementation of best practices throughout the enterprise.
- Milestone payments.
- Focus on customer demand.
- Daily production and distribution planning, including all nodes in the supply chain.
- Production scheduling for each manufacturing facility in the supply chain (minute by minute).
- Demand planning and forecasting, coordinating the demand forecast of all customers and sharing the forecast with all suppliers.
- Sourcing planning, including current inventory and forecast demand, in collaboration with all suppliers.
- Inbound operations, including transportation from suppliers and receiving inventory.
- Production operations, including the consumption of materials and flow of finished goods.
- Outbound operations, including all fulfillment activities, warehousing and transportation to customers.
- Order promising, accounting for all constraints in the supply chain, including all suppliers, manufacturing facilities, distribution centers, and other customers. (Mentzer, J.T. et al. (2001): Defining Supply Chain Management , in: Journal of Business Logistics, Vol. 22, No. 2, 2001, p.1-25)

Organizations increasingly find that they must rely on effective supply chains, or networks, to successfully compete in the global market and networked economy. In Peter Drucker's (1998) new management paradigms, this concept of business relationships extends beyond traditional enterprise boundaries and seeks to organize entire business processes throughout a value chain of multiple companies.

During the past decades, globalization, outsourcing and information technology have enabled many organizations, such as Dell and Hewlett Packard, to successfully operate solid collaborative supply networks in which each specialized business partner focuses on only a few key strategic activities (Scott, 1993). This inter-organizational supply network can be acknowledged as a new form of organization. However, with the complicated interactions among the players, the network structure fits neither "market" nor "hierarchy" categories (Powell, 1990). It is not clear what kind of performance impacts different supply network structures could have on firms, and little is known about the coordination conditions and trade-offs that may exist among the players. From a systems perspective, a complex network structure can be decomposed into individual component firms (Zhang and Dilts, 2004). Traditionally, companies in a supply network concentrate on the inputs and outputs of the processes, with little concern for the internal management working of other individual players. Therefore, the choice of an internal management control structure is known to impact local firm performance (Mintzberg, 1979).

In the 21st century, changes in the business environment have contributed to the development of supply chain networks. First, as an outcome of globalization and the proliferation of multinational companies, joint ventures, strategic alliances and business partnerships, significant success factors were identified, complementing the earlier "Just-In-Time",

"Lean Manufacturing" and "Agile Manufacturing" practices. Second, technological changes, particularly the dramatic fall in information communication costs, which are a significant component of transaction costs, have led to changes in coordination among the members of the supply chain network (Coase, 1998).

Many researchers have recognized these kinds of supply network structures as a new organization form, using terms such as "Keiretsu", "Extended Enterprise", "Virtual Corporation", "Global Production Network", and "Next Generation Manufacturing System". In general, such a structure can be defined as "a group of semi-independent organizations, each with their capabilities, which collaborate in ever-changing constellations to serve one or more markets in order to achieve some business goal specific to that collaboration" (Akkermans, 2001).

The security management system for supply chains is described in ISO/IEC 28000 and ISO/IEC 28001 and related standards published jointly by ISO and IEC.

Developments in Supply Chain Management

Six major movements can be observed in the evolution of supply chain management studies: Creation, Integration, and Globalization (Lavassani et al., 2008^a), Specialization Phases One and Two, and SCM 2.0.

Creation Era

The term supply chain management was first coined by a U.S. industry consultant in the early 1980s. However, the concept of a supply chain in management was of great importance long before, in the early 20th century, especially with the creation of the assembly line. The characteristics of this era of supply chain management include the need for large-scale changes, re-engineering, downsizing driven by cost reduction programs, and widespread attention to the Japanese practice of management.

Integration Era

This era of supply chain management studies was highlighted with the development of Electronic Data Interchange (EDI) systems in the 1960s and developed through the 1990s by the introduction of Enterprise Resource Planning (ERP) systems. This era has continued to develop into the 21st century with the expansion of internet-based collaborative systems. This era of supply chain evolution is characterized by both increasing value-adding and cost reductions through integration.

Globalization Era

The third movement of supply chain management development, the globalization era, can be characterized by the attention given to global systems of supplier relationships and the expansion of supply chains over national boundaries and into other continents. Although the use of global sources in the supply chain of organizations can be traced back several decades (e.g., in the oil industry), it was not until the late 1980s that a considerable number of organizations started to integrate global sources into their core business. This era is characterized by the globalization of supply chain management in organizations with the goal of increasing their competitive advantage, value-adding, and reducing costs through global sourcing. (CSCMP Supply Chain Management Process Standards)

Specialization Era—Phase One: Outsourced Manufacturing and Distribution

According to (Cooper et al., 1997; Lambert et al., 1996; Turnbull, 1990), companies abandoned vertical integration, sold off non-core operations, and outsourced those functions to other companies. This changed management requirements by extending the supply chain well beyond company walls and distributing management across specialized

supply chain partnerships.

This transition also re-focused the fundamental perspectives of each respective organization. OEMs became brand owners that needed deep visibility into their supply base. They had to control the entire supply chain from above instead of from within. Contract manufacturers had to manage bills of material with different part numbering schemes from multiple OEMs and support customer requests for work-in-process visibility and vendor-managed inventory (VMI).

The specialization model creates manufacturing and distribution networks composed of multiple, individual supply chains specific to products, suppliers, and customers, who work together to design, manufacture, distribute, market, sell, and service a product. The set of partners may change according to a given market, region, or channel, resulting in a proliferation of trading partner environments, each with its own unique characteristics and demands. (Stevens, 1989; Ellram and Cooper, 1993; Ellram and Cooper, 1990; Houlihan, 1985)

Specialization Era—Phase Two: Supply Chain Management as a Service

Specialization within the supply chain began in the 1980s with the inception of transportation brokerages, warehouse management, and non-asset-based carriers and has matured beyond transportation and logistics into aspects of supply planning, collaboration, execution and performance management.

At any given moment, market forces could demand changes from suppliers, logistics providers, locations and customers, and from any number of these specialized participants as components of supply chain networks. This variability has significant effects on the supply chain infrastructure, from the foundation layers of establishing and managing the electronic communication between the trading partners to more complex requirements including the configuration of the processes and work flows that are essential to the management of the network itself.

Supply chain specialization enables companies to improve their overall competencies in the same way that outsourced manufacturing and distribution has done; it allows them to focus on their core competencies and assemble networks of specific, best-in-class partners to contribute to the overall value chain itself, thereby increasing overall performance and efficiency. The ability to quickly obtain and deploy this domain-specific supply chain expertise without developing and maintaining an entirely unique and complex competency in house is the leading reason why supply chain specialization is gaining popularity.

Outsourced technology hosting for supply chain solutions debuted in the late 1990s and has taken root primarily in transportation and collaboration categories. This has progressed from the Application Service Provider (ASP) model from approximately 1998 through 2003 to the On-Demand model from approximately 2003-2006 to the Software as a Service (SaaS) model currently in focus today.

Supply Chain Business Process Integration

Successful SCM requires a change from managing individual functions to integrating activities into key supply chain processes. An example scenario: the purchasing department places orders as requirements become known. The marketing department, responding to customer demand, communicates with several distributors and retailers as it attempts to determine ways to satisfy this demand. Information shared between supply chains partners can only be fully leveraged through process integration. Supply chain business process integration involves collaborative work between buyers and suppliers, joint product development, common systems and shared information. According to Lambert and Cooper (2000), operating an integrated supply chain requires a continuous information flow. However, in many companies, management has reached the conclusion that optimizing the product flows cannot be accomplished without

implementing a process approach to the business.

The Key Supply Chain Processes Stated by Lambert (2004) Are

- Customer relationship management
- Customer service management
- Demand management
- Order fulfillment
- Manufacturing flow management
- Supplier relationship management
- Product development and commercialization
- Returns management

Much has been written about demand management. Best-in-class companies have similar characteristics, which include the following: a) Internal and external collaboration b) Lead time reduction initiatives c) Tighter feedback from customer and market demand d) Customer level forecasting

One could suggest other critical supply business processes which combine these processes stated by Lambert such as

- Customer service management
- Procurement
- Product development and commercialization
- Manufacturing flow management/support
- Physical distribution
- Outsourcing/partnerships
- Performance measurement

Objective of the Study

The study attempts to find out the relationship between SCM and its influence on organizational performance in the filtered water industry.

Methodology

The study used both survey and in-depth interview to gather primary data. Simple random sampling was used to select respondents. The study area was limited to the northern sector of Ghana comprising the Ashanti, Brong Ahafo, Northern regions. These areas were purposively selected due to the proliferation of sachet water factories in the regions. The study focused on the impact of supply chain management on some selected filtered water producers in selected areas of study. Microsoft excel was used to process the data. Descriptive statistics was for easy comparison to draw conclusions.

Research Design

The research is a case study. 550 companies in the filtered water industry were selected. Primary data were gathered from all companies. Secondary data were also gathered from existing studies on the research. Target population was determined and a sample selected by the use of probability sampling technique. Structured questionnaires were used to gather the data and Microsoft Excel tables and charts used to analyze the data.

Sources of Data

There are two kinds of data, primary and secondary data. The data gathered through interview and questionnaire was the primary data while the secondary data was gathered through internet search engines and book reviews. Data collection means gathering information to address the critical questions that had been identified earlier in the study. Many methods available to gather information and a wide variety of information sources were identified.

Population

The population of the case study is all the firms in the filtered water industry in the northern part of Ghana. The population was too large for the researcher to attempt to survey all of its members. A carefully chosen sample was selected to represent the population. According to the Association of filtered water producers their membership stands at one thousand five hundred (1500). This means that the population of the study area is thousand five hundred (1500).

Sample Size

In general the larger the sample size, the more likely the responses will reflect the true picture of the population under study. A sample size of five hundred and fifty (550) firms was selected for the study to provide reliable findings.

Sample Technique

A combination of judgmental (purposive) and simple random sampling techniques were employed. Both probability (simple random sampling) and non-probability (judgmental/purposive) sampling techniques were used in this study. Non-probability was selected on the basis of personal judgment or convenience; the probability of any member of the population being chosen is unknown and probability sampling because every member of the population will have a known non-zero probability of selection. In this study the choice of filtered water industry was based on judgmental or purposive sampling. However, in the case of individual firms in the industry a simple random sampling technique was used to give each firm an equal chance of being included in the sample.

Data Collection Techniques

The primary instrument for data collection in this research was semi-structured questionnaires, which contained a mixture of closed ended and open-ended questions. The research employed the questionnaire method because it has advantages in terms of versatility of the method as well as speed and cost. A Likert scale was used in this research such that respondents were presented with a list of attributes for which they were asked to indicate their relative importance and evaluations in terms of organizational performance.

Analysis of Data

Primary data generated by the study were cleaned to ensure consistency and transcribed in coded form into the computer using Microsoft Excel. The data were examined, categorized, tabulated and recombined the evidence to address the research objectives and the research questions. The data were then edited and tallied in frequency table. The values corresponding to frequencies were later converted into percentages to facilitate comparison between the responses in tables and charts.

DATA ANALYSIS, RESULTS AND DISCUSSIONS

The Role of SCM in the Filtered Industry

Supply chain management is said to be one of the integrated approaches to management. It is said that successful implementations of supply chain management has been credited with helping to cut cost, increase technological innovation, increase profitability and productivity, reduce risk and improve organizational effectiveness (Wisner and Choon, 2005). In view of these, respondents were asked to state the reasons for companies (filtered water) involvement in SCM activities. According to Keamey (1985) one of the reasons why organizations incorporate SCM is that it reduces cost. In relation to this study tested the variable cost, whether or not SCM reduces organizational cost.

Relationship between Supply Chain Management and Organizational Performance

Table: The Existence of a Relationship between Supply Chain Management and Organizational Performance

Table 1

Relationship	Frequency	Percentage (%)
Yes	358	65.1
No	192	34.9
Total	550	100

Source: Researcher's Fieldwork (January, 2013)

From the table, 65.1 percent of the respondents agreed there is a relationship between supply chain management and organizational performance whilst 34.9 percent thinks there is no relationship between the two. Of the 65.1% that agreed that there is relationship between supply chain management and organisational performance were yet to fully reap the benefits.

TYPE of Relationship

Table 2

Type of Relationship	Frequency	Percentage (%)
Positive	326	63.3
Negative	224	36.7
Total	550	100

Source: Researcher's fieldwork (January, 2013)

From the table above, 63.3% of respondents agree that there is a positive relationship between Supply Chain Management and organisational performance while 36.7% intimates negative relationship. From the forgoing, the general implication is that there is positive relationship between Supply Chain Management and organizational performance.

Reasons for Positive Relationship

Table 3

Variable	Frequency	Percentage (%)
Cost reduction / increased productivity	126	38.7
Quality improvement / cost reduction	93	28.5
Increased productivity / quality improvement	107	32.8
Total	326	100

Source: Researcher's Fieldwork (Jan, 2013)

FINDINGS

It was discovered from the study that there is a relationship between SCM and organizational performance.

This stems from the fact that it is when the various components of SCM have been allowed to work effectively that there can be a greater improvement in the performance of the filtered water industry.

CONCLUSIONS

Most filtered water companies in northern Ghana agree that there is a positive relationship between SCM activities and organizational performance which can help them achieve their goals as it is expected of them. The study also provided support for the claims of supply chain management proponents that supply chain management allows companies to reduce cost, improve quality, increase productivity, and improve organizational competitiveness. Supply chain management, in this sense, is beneficial to organizational effectiveness.

RECOMMENDATIONS

In response to the findings of the study, these recommendations are hereby forwarded. Some of them were recommendations made by the filtered water producers themselves.

- It is recommended that filtered water companies who do not practice SCM activities should endeavor to do so as it will in the long run help them to achieve the ultimate aims.
- In order to be successful in understanding SCM activities, filtered water companies should sit down and identify factors which rather make them unsuccessful to meet planned or actual demand as the most serious problem facing the SCM effort. It is when those factors have been identified and solutions found to them that can make the filtered water industry successful.

REFERENCES

1. Akkermans H. 2001. Renga: A systems approach to facilitating inter-organizational network development. *System Dynamics Review* 17 (3): 179-193.
2. Coase, Ronald, 1998. "The New Institutional Economics," *American Economic Review*, American Economic Association, vol. 88(2), pages 72-74
3. Cooper, M.C., Lambert, D.M., and Pagh, J. (1997) *Supply Chain Management The International Journal of Logistics Management*.
4. Graham C. Stevens, (1989) "Integrating the Supply Chain", *International Journal of Physical Distribution & Logistics Management*, Vol. 19 Iss: 8, pp.3 – 8
5. Lambert, Douglas M , Martha C Cooper (200) 'Issues in Supply Chain Management' *Industrial Marketing Management* Volume 29, Issue 1, January 2000, Pages 65–83
6. Larson, P.D. and Halldorsson, A. (2004), "Logistics versus supply chain management: an international survey". *International Journal of Logistics: Research and Application*.
7. Martha C. Cooper, Lisa M. Ellram, (1993) "Characteristics of Supply Chain Management and the Implications for Purchasing and Logistics Strategy", *International Journal of Logistics Management*, The, Vol. 4 Iss: 2, pp.13 - 24
8. Mentzer, J.T. et al. (2001): 'Defining Supply Chain Management', *Journal of Business Logistics*, Vol. 22, No. 2, 2001, p.1-25
9. Mentzer, J.T (2001) *Supply Chain Management*, Sage Publication, Inc., Thousand Oaks.

10. Martha C. Cooper, Lisa M. Ellram, (1993) "Characteristics of Supply Chain Management and the Implications for Purchasing and Logistics Strategy", *International Journal of Logistics Management*, The, Vol. 4 Iss: 2, pp.13 – 24
11. Mintzberg, H., (1979) *The Structuring of Organizations: A Synthesis of the Research* Prentice-Hall, 1979
12. Zhang, Yong and Dilts, DM, (2004) "System Dynamics of Supply Chain Network Organization Structure," *Information Systems and e-Business Management: Special Issue on Supply Chain Management*, 2:187-206

